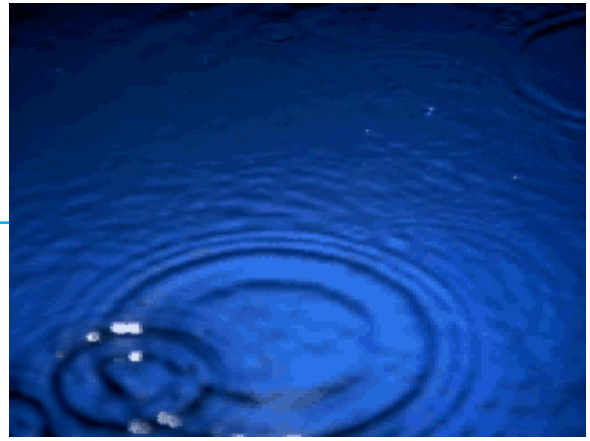
GPM

GLOBAL PRECIPITATION MEASUREMENT

Global Precipitation Measurement

System Definition Review

Precipitation Processing System



December 6-8, 2005

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ASRC Aerospace

PPS Team

- ***Composed Of Three Groups***
  - *Civil Servants*
  - *George Mason University Co-op Agreement (science and programming)*
  - *ASRC/RSIS (Engineering, L1 code, I&T, Geolocation)*

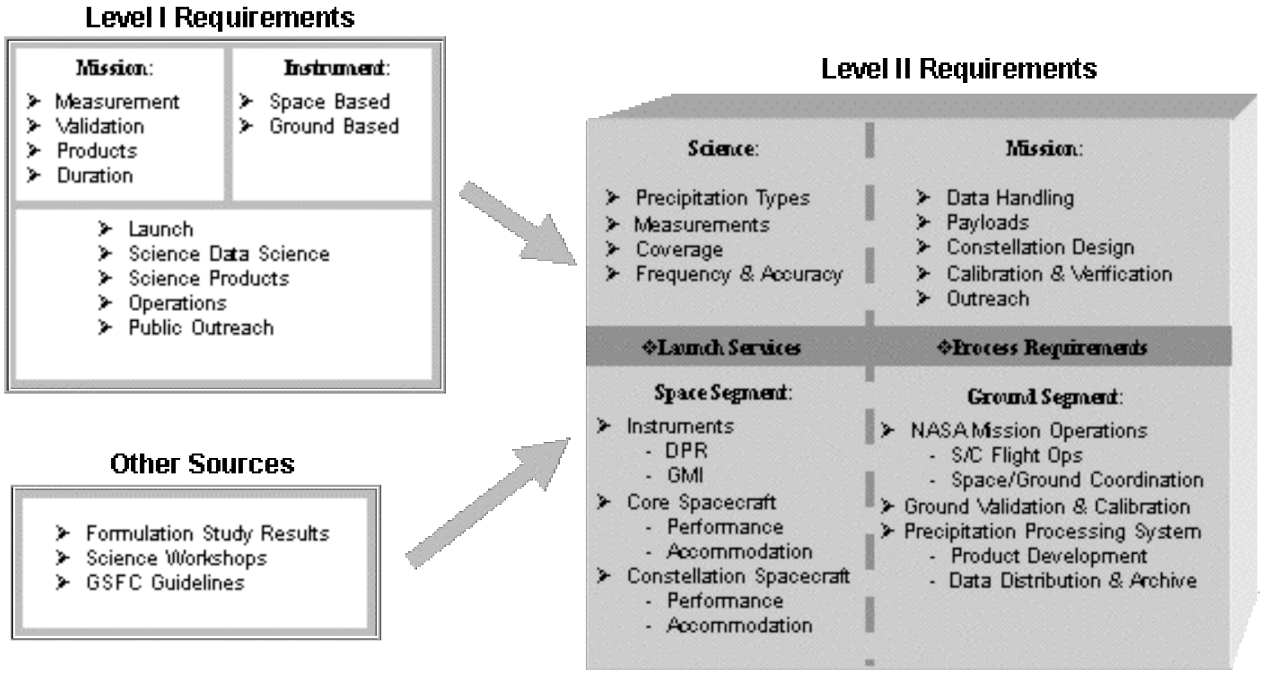
- ***Approximately 22 FTE in the Following Categories:***
  - *Management*
  - *Science Analysts*
  - *Science Programmers*
  - *Database Programmer*
  - *Programmers*
  - *System Engineering*
  - *Integration and Test*

- ***_ of Team Have TSDIS Experience***

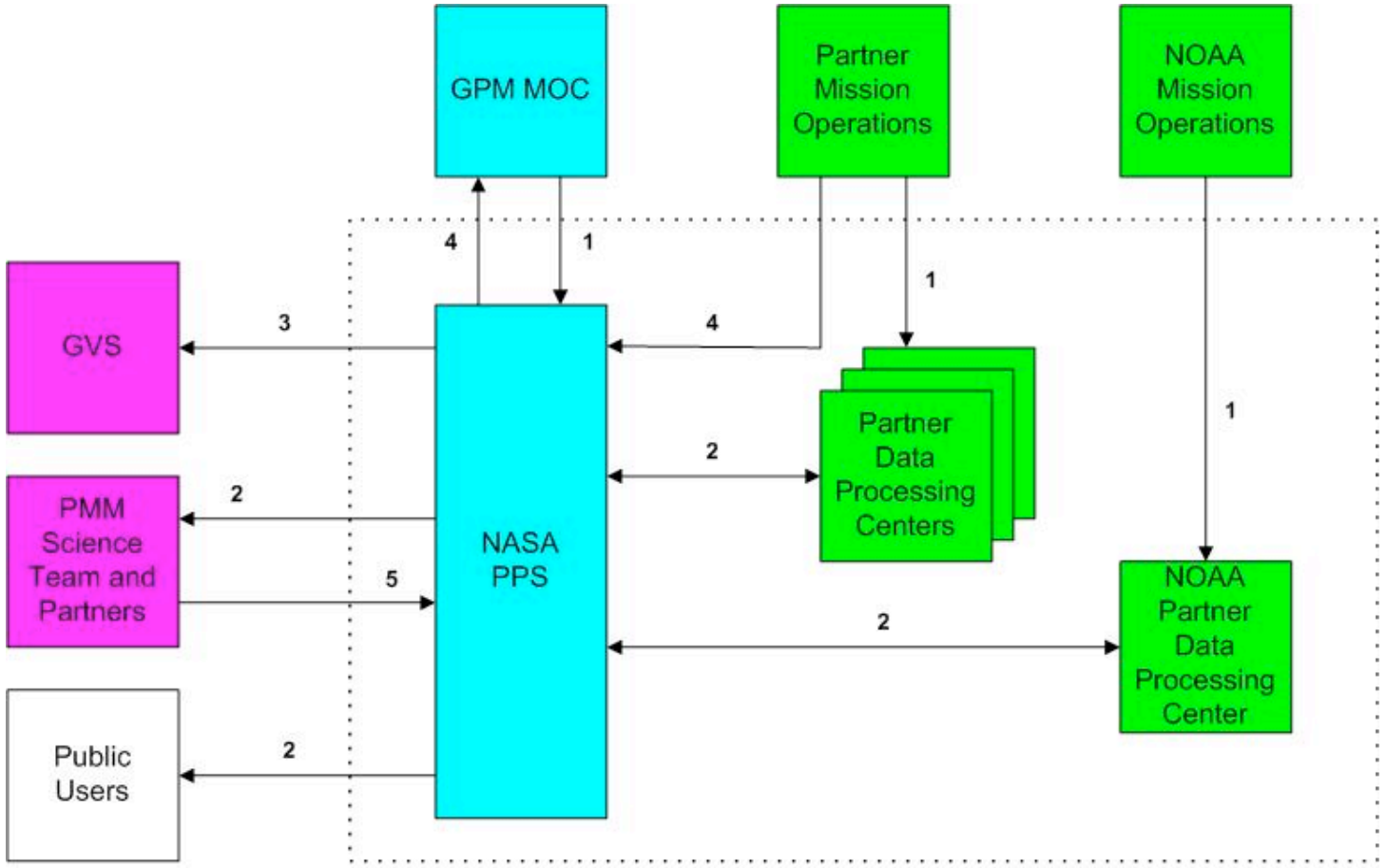
Topics Presented

- *PPS Introduction and Concept*
- *Driving Level-2 Requirements*
- *Implementation Approach*
- *Architecture Overview*
- *Trade Studies*
- *PPS Documentation*
- *Risks*
- *Issues and Concerns*
- *Road to PDR*
- *Schedule*
- *Operation Concept*

Precipitation Processing System Level 2 Introduction



Data Processing Level-2 Architecture



1 = Applicable science data and spacecraft data
2 = Science data and products
3 = Overpass files and science products
4 = DPR Instrument Command Requests and Loads
5 = Science Algorithms

NASA Asset
Partner Asset
Shared Asset

Changes From SRR

- ***PPS Ops Phase Archive***
  - *PPS will archive and distribute GPM Mission data during operation of the Core and NASA Constellation*
  - *Data will be transferred to a designated facility for long-term archive 6 months after NASA-provided satellites end operations*

- ***GVS Product Ingest Deleted***
  - *PPS will no longer ingest any GVS data or products*

Driving Level-2 Requirements (1 of 4)

- ***Simultaneous Processing Capacity*** ***[7.2.20]***
  - *Support for initial processing and reprocessing*
- ***Data Ingest*** ***[7.2.2]***
  - *Defines the capability to bring raw data into the PPS*
- ***Ground Validation*** ***[7.2.16,7.2.17]***
  - *Coordinate overpasses and co-observations*
- ***Data Processing Operations*** ***[7.2.12,7.2.21]***
  - *Create specified products within required latency*
- ***Data Archiving and Distribution [7.2.7,7.2.10,7.3.1]***
  - *Makes sure the proper people have data in a timely manner*
- ***DPR Algorithms*** ***[7.2.19]***
  - *Provides capability to integrate the DPR science algorithms from JAXA*
- ***Science Algorithm Support*** ***[7.2.18]***
  - *PPS will provide resources to test and ingest new and improved science algorithms*

Driving Level-2 Requirements (2 of 4)

- ***Outreach Products*** ***[8.2,8.3]***
  - *Color rain map updated every 15 minutes with newly arrived data*
  - *DPR Products*
    - *KuPR surface rain at instrument field of view*
    - *KuPR multi-level rain at instrument field of view*
    - *Combined Ku- and Ka-PR surface rain at instrument field of view*
    - *Combined Ku- and Ka-PR multi-level rain at instrument field of view*
  - *GMI Radiometer Products*
    - *10 min Calibrated Brightness Temperature at instrument field of view*
    - *10 min Surface Rain at instrument field of view*
  - *Other Radiometers*
    - *GPM orbit-standard inter-calibrated Brightness Temperature at instrument field of view (1C)*
    - *GPM orbit-standard Surface Rain at instrument field of view*
  - *3-hour Merged Product at .25 x .25 degree grid*
    - *Low Latency - Merged radar,radiometer, IR with oldest data no older than 5 hours (low latency but less data)*
    - *High Latency - Merged radar, radiometer, IR with old data no older than 8 hours (high latency, but more complete data)*

Driving Level-2 Requirements (3 of 4)

- ***Research Products*** ***[7.2.12]***
  - *Raw Data*
  - *Raw Data put into granule configuration and unpacked (L1A)*
  - *Radiometer*
    - *GMI - Brightness Temperature in GPM orbit-standard at instrument field of view*
    - *Partner – Inter-calibrated Brightness Temperature in GPM orbit-standard at instrument field of view*
    - *Rain Product at Instrument Field of View*
    - *Monthly gridded .25 x .25 degree individual radiometer rain product*
    - *Monthly gridded .25 x .25 degree combined radiometer rain product*

Driving Level-2 Requirements (4 of 4)

- ***Research Products (continued)***
  - *DPR*
    - *Raw data*
    - *Raw Data Unpacked and put in standard granule size*
    - *KaPR Powers at instrument field of view (L1B)*
    - *KuPR Powers at instrument field of view (L1B)*
    - *KaPR Reflectivity at instrument field of view (L1C)*
    - *KuPR Reflectivity at Instrument field of view (L1C)*
    - *KuPR rain products (L2)*
    - *KaPR rain products (L2)*
    - *Combined Ku- and KaPR rain products (L2)*
    - *Monthly, gridded .25 x .25 degree rain products (L3)*
  - *Merged Products*
    - *3-hr .25 x .25 degree merged PR, radiometer, IR rain product*
    - *monthly .25 x .25 degree merged PR, radiometer, IR rain product*

Driving L-2 Requirements From External Systems

- ***MOC Ingest*** ***[7.2.2]***
  - *Latency from MOC to PPS*
  - *Files Size*
  - *Exchange Protocol*

- ***Partner Ingest*** ***[7.2.2]***
  - *Latency*
  - *Files Size*
  - *Exchange Protocol*

Driving L-2 Requirements on External Systems

- ***DPR Algorithms [7.2.19]***
  - *Specifies that PPS will receive L-1 algorithms from JAXA*

Implementation Approach (1 of 2)

- ***Overall GPM Data Processing System Architecture***
  - *Geographically distributed among partners*
  - *PPS is NASA's contribution to the distributed system*
  - *Major partner role in the provision of data through Level 1b and algorithms*
  - *Federated approach (interchange through published ICDs)*
- ***Evolution from TRMM Science Data Information System***
- ***Already working system***

Implementation Approach (2 of 2)

- ***Prototyping and Incremental Development Approach***
  - *Four Incremental Builds*
  - *Build 1 is an early PPS version that will assume TRMM data processing*
  - *Subsequent builds are tied to science algorithms development*
  - *Build deliveries tied to the project end to end testing*
  - *Each Build goes through PPS I & T testing*
  - *Operational Build goes through a 90-day acceptance test that simulates both forward and reprocessing*
  - *Operational Build contains the "at launch" science algorithm code*

- ***PPS Build-1 will be used for TRMM Version 7 Reprocessing***

PPS Top Level Software Architecture

PPS Trade Studies

- ***Beowulf Cluster vs. Gridded Cluster***
- ***Process Scheduling Alternatives***
- ***Approach for Clustered Storage***

PPS Documentation

Document Name	Document Number	Status
PPS Project Management Plan	PPS-610.2-101	Draft
PPS Configuration Management Plan	PPS-610.2-102	Version 1
PPS Operations Concept	PPS-610.2-103	Draft
PPS Build Plan	PPS-610.2-104	Draft
PPS Requirements Document	PPS-610.2-201	Draft
PPS to Science Team ICS	PPS-610.2-221	Preliminary post PDR
PPS Product Specification	PPS-610.2-231	Preliminary post PDR
PPS Product Volume Estimates	PPS-610.2-231a	Preliminary post PDR
PPS Master Test Plan	PPS-610.2-301	Draft
PPS System Test Plan	PPS-610.2-302	Preliminary Draft
PPS Acceptance Test Plan	PPS-610.2-303	Preliminary post PDR
PPS System Test Procedures	PPS-610.2-32x	Preliminary post PDR
PPS Component Test Procedures	PPS-610.2-34x	Preliminary post PDR
PPS Acceptance Test Procedures	PPS-610.2-36x	Preliminary post PDR
PPS Software Architecture Document	PPS-610.2-401	Draft
PPS Operation Manual	On-Line	Preliminary post PDR

- ***JAXA Data Policy*** ***[Risk H-2]***
  - *Will JAXA allow PPS to freely distribute DPR data and products?*

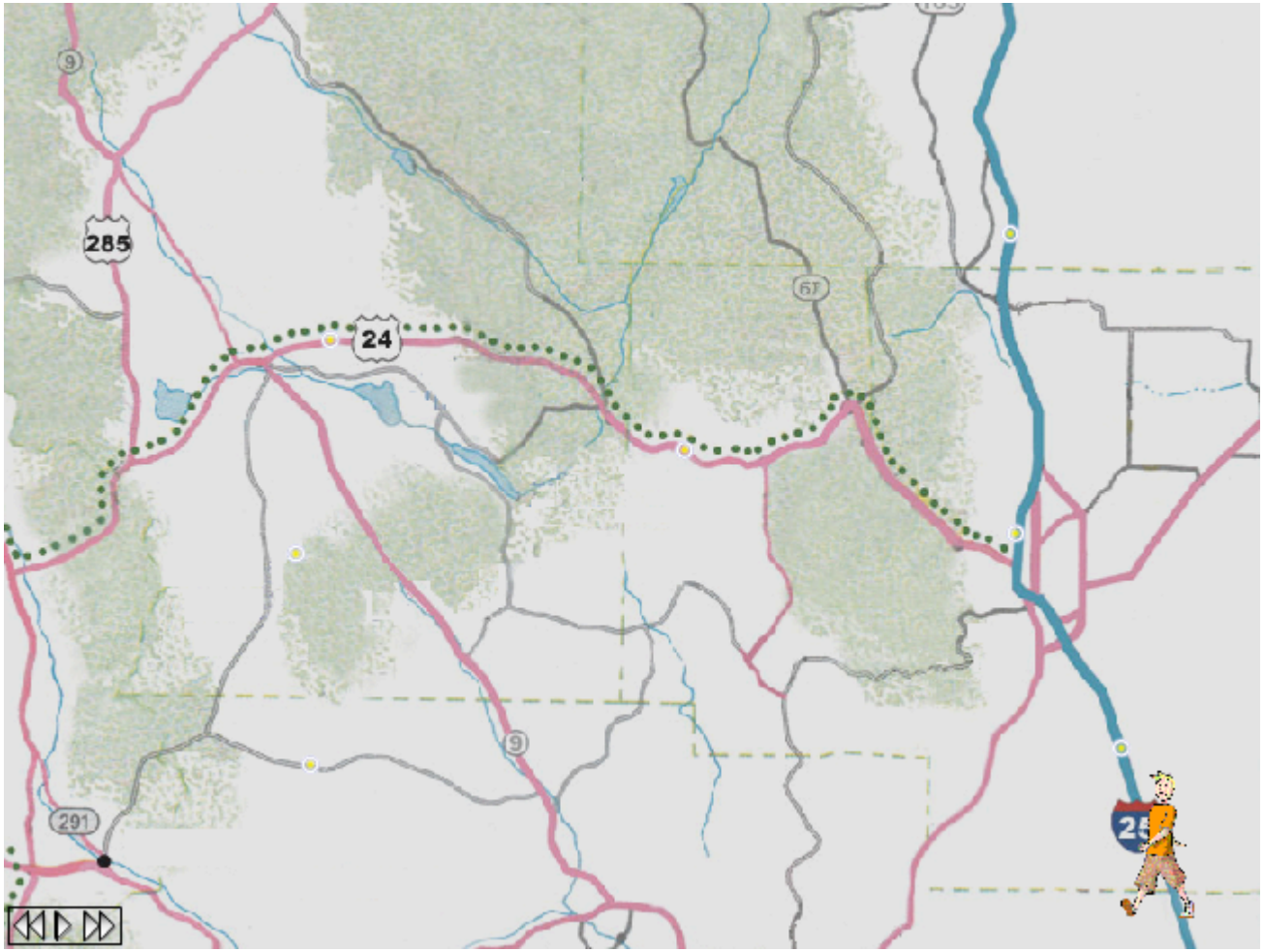
This is a mission level risk tracked at project level

Issues and Concerns

- ***NASA/GSFC Network Security***
  - *May be too restrictive with regard to data ingest and distribution from/to partner sites*
  - *May be too restrictive with regard to data distribution to users*

- ***DPR Algorithm Acquisition [7.2.19]***
  - *Will JAXA provide PPS with appropriate DPR algorithms in a timely manner?*

PPS Roadmap to PDR

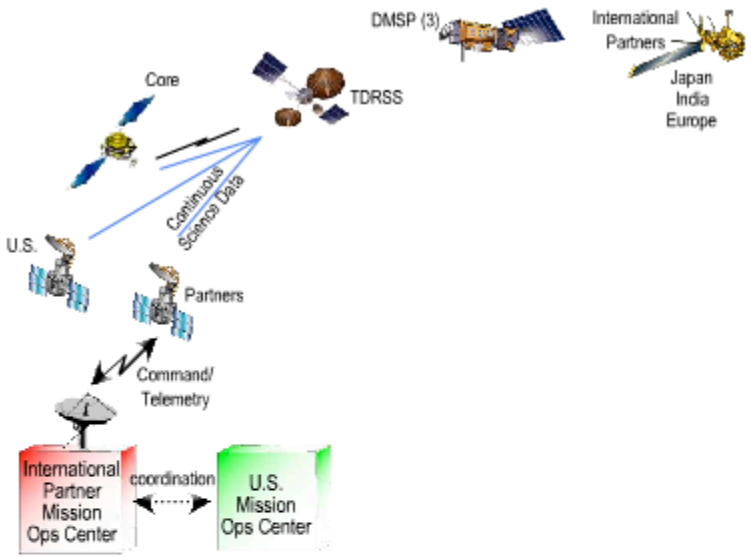


Road to PDR

- ***PPS Activities***
  - *Complete Draft PPS Project Management Plan: January 2006*
  - *Complete Preliminary PPS Build Plan: February 2006*
  - *Complete Preliminary PPS Operations Concept Document: February 2006*
  - *Complete Draft of Trade Studies: May 2006*

- ***PPS Reviews***
  - *PPS Build-1 Review – February 21-22, 2006*

PPS Operations Concept



PPS Reviews

- ***Schedule***
  - *Demo #1 – September 2002*
  - *Demo #2 – May 2004*
  - *Build 1 Review – February 21-22, 2006*

- ***Attendance***
  - *Scientists (internal and external)*
  - *NOAA*
  - *NASA HQ*
  - *GPM Project*

Agenda

Day 2 - December 7, 2005
Location: NASA GSFC B16W-N76/80

Time	Section	Event	Presenter
8:30 AM	12	Core Spacecraft Management	Horowitz
9:30 AM	13	Primary Spacecraft Systems Engineering	O'Neill
11:00 AM		**Break**	
11:15 AM	14	Mission Operations System Concept/Requirements	Rykowski
12:15 PM		**Lunch**	
1:15 PM	15	Precipitation Processing System Concept/Requirements	Stocker
2:15 PM	16	Ground Validation	Schwaller
3:15 PM		**Break**	
3:30 PM	17	Risk Assessment	Durning
3:45 PM	18	Review Wrap Up	Durning/Ho
4:00 PM		Review Team Caucus	
4:15 PM		**End of Day 2**	